ENTOMOLOGICAL NEWS

MARCH, 1934

Vol. XLV No. 3

HARRISON GRAY DYAR,
1866-1929.

CONTENTS

McAtee—On Protective Adaptations. 57
Van Dyke—New Species of Buprestidae (Coleoptera) with Notes Concerning Others 61
Rodeck—Osmia permorata Ckll. the Female of O. abnormis Cresson (Hymenoptera: Apoidea). 66
Hilton—A New Species of Pauropus from Iowa (Pauropoda) 67
Knull—Two New Arizona Coleoptera (Buprestidae and Cerambycidae) 68
Ferris—A Summary of the Sucking Lice (Anoplura). 70
Jacot—Zur Systematik der Oribatiden (Acarina) nach Willmann (May, 1930). 74
Entomological Literature 77
Obituary—Professor Henry Frederick Wickham 83
Obituary—Professor William Morris Davis. 84

PHILADELPHIA, PA.
THE ACADEMY OF NATURAL SCIENCES,
Logan Square

Entered at the Philadelphia, Pa., Post Office as Second Class Matter.
Acceptance for mailing at the special rate of postage prescribed for in Section 1.
Act of October 3, 1917, authorized January 15, 1921.

ENTOMOLOGICAL NEWS

published monthly, excepting August and September, by The American Entomological Society.

Philip P. Calvert, Ph.D., Editor; E. T. Cresson, Jr., R. G. Schmieder, Ph.D., Associate Editors.

Advisory Committee: Philip Laurent, J. A. G. Rehn, Chas. Liebeck, J. Chester Bradley, Ph.D., Frank Morton Jones, Sc.D., John C. Lutz, Max Kisliuk, Jr., Wm. W. Chapman.

The subscription price per year of ten (10) numbers is as follows:

United States and possessions, Central and South America	$3.00
Canada	3.15
Foreign	3.25

Single copies 35 cents.

ADVERTISING RATES: Full width of page. Payments in advance.
One issue, 1 in., $ 1.20, 2 in., $ 2.40, half page, $ 4.00, full page, $ 7.00
Ten issues " 11.00, " 20.00, " 35.00, " 60.00

SUBSCRIPTIONS. All remittances and communications regarding subscriptions, non-receipt of the NEWS or of reprints, and requests for sample copies, should be addressed to

ENTOMOLOGICAL NEWS, 1900 Race Street, PHILADELPHIA, PA.

All complaints regarding non-receipt of issues of the NEWS should be presented within three months from date of mailing of the issue. After that time such numbers, if available, will be supplied only by purchase. Not more than two issues will be replaced gratis, through loss in transit or in change of address, unless such have been registered, at the subscriber's expense. No subscriptions accepted which involve giving a receipt acknowledged before a notary, except at the subscriber's expense.

MANUSCRIPTS AND ADVERTISEMENTS. Address all other communications to the editor, Dr. P. P. Calvert, Zoological Laboratory, University of Pennsylvania, Philadelphia, Pa.

TO CONTRIBUTORS. All contributions will be considered and passed upon at our earliest convenience and, as far as may be, will be published according to date of reception. The receipt of all papers will be acknowledged. Owing to the limited size of each number of the NEWS, articles longer than six printed pages will be published in two or more installments, unless the author be willing to pay for the cost of a sufficient number of additional pages in any one issue to enable such an article to appear without division.

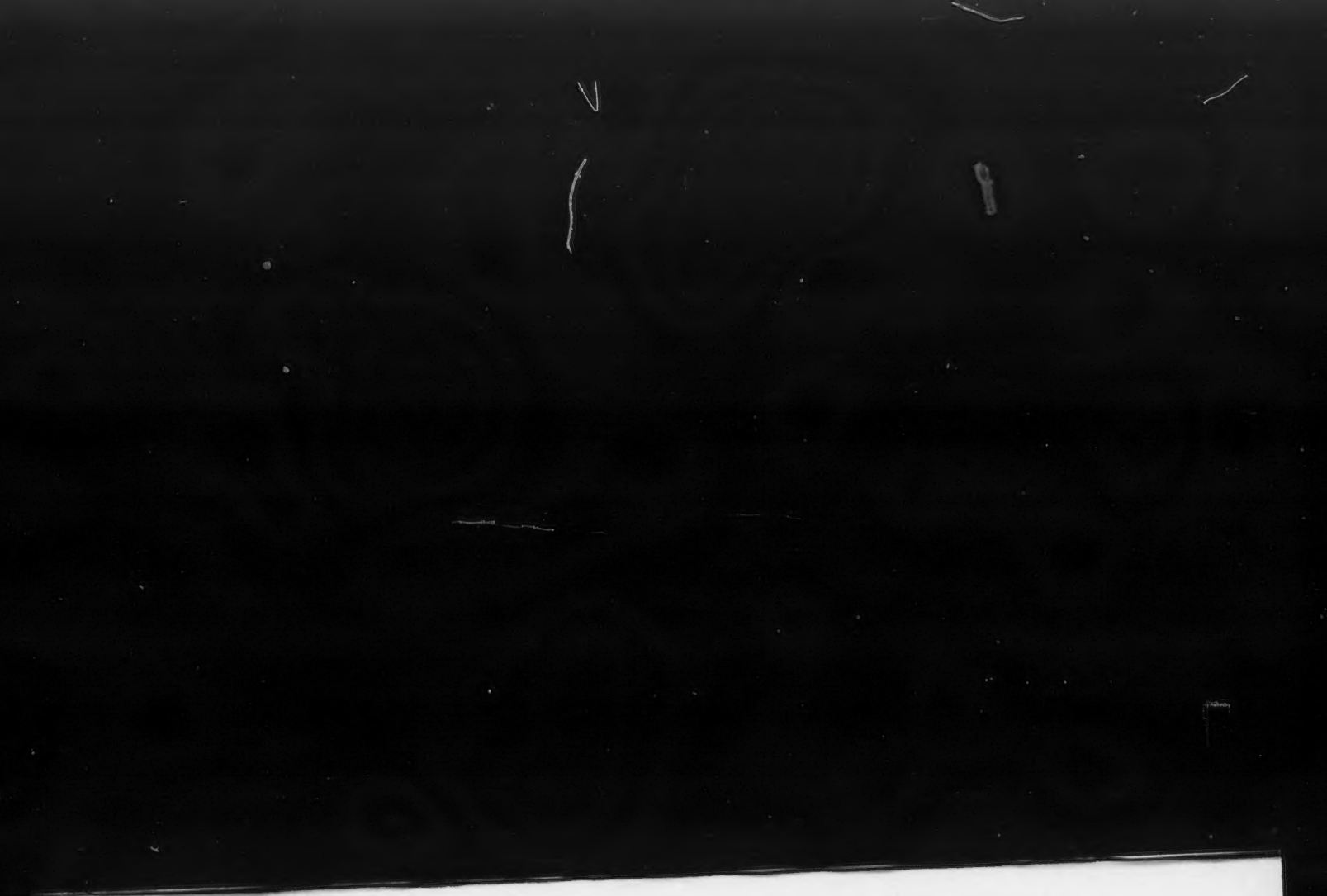
Proof will be sent to authors. Twenty-five "extras" of an author's contribution, without change in form and without covers, will be given free when they are wanted; if more than twenty-five copies are desired *this should be stated on the MS.*

Owing to increased cost of labor and materials, no illustrations will be published in the NEWS for the present, except where authors furnish the necessary blocks (or pay in advance the cost of making blocks) and also pay for the cost of printing plates. Information as to the cost will be furnished in each case on application to the Editor. Blocks furnished or paid for by authors will, of course, be returned to authors, after publication, if desired.

Stated Meetings of The American Entomological Society will be held at 8.00 P. M., in 1934, on the fourth Thursday of each month excepting February, June, July and August, and on the third Thursday of February.

Communications on observations made in the course of your studies are solicited; also exhibits of any specimens you consider of interest.

The printer of the "News" will furnish reprints of articles without covers over and above the twenty-five given free at the following rates: One or two pages, twenty-five copies, 35 cents; three or four pages, twenty-five copies, 70 cents; five to eight pages, twenty-five copies, $1.40; nine to twelve pages, twenty-five copies, $2.00; each half-tone plate, twenty-five copies, 30 cents; each plate of line cuts, twenty-five copies, 25 cents; greater numbers of copies will be at the corresponding multiples of these rates. Printed covers for 50 copies, $4.00 or more, according to number of pages bound.



ENTOMOLOGICAL NEWS

VOL. XLV. MARCH, 1934 No. 3

On Protective Adaptations.

By W. L. McATEE, U. S. Biological Survey, Washington, D. C.

There is a question as to the desirability of replying to all criticisms, and in fact I have not followed that policy with respect to the paper challenged by Harold O'Byrne in ENTOMOLOGICAL NEWS for March, 1933. It almost seems that my article on protective adaptations can not be understood by persons who have not had experience in making analyses of the stomach contents of vertebrates.

Mr. O'Byrne says he agrees with me as to the indiscriminacy of predators, considering only the higher groups of their prey, but does not agree as to categories smaller than families. The data as to food items presented by me were built up from computations of the frequency of capture of various kinds of prey by *species* of birds, but were not presented in detail because that would have been impossible from a publication standpoint. There is, however, no logic in rejecting the results for certain taxonomic groups, and not for all, as the basis for them in all cases is the same.

It is not a fair conclusion that my paper concentrates attention upon warning coloration and related adaptations, for upon scanning it again, I find that concealing habits, and cryptic coloration are mentioned in most of the sections devoted to "protective adaptations" of the various groups. Nothing was glossed over as Mr. O'Byrne implies, and if insufficient emphasis was placed upon cryptically adapted prey, it was because of the abundant evidence in all parts of my tabulations that such organisms are freely eaten. It is furthermore a necessary corollary of selectionist doctrine that if some forms are "specially protected" then others must bear the brunt of predatory attack. If the theory were a worthy guide to what happens in nature, it could only be interpreted as meaning that cryptically colored species have an inferior sort of protection. According to theory they must hide, while the others may flaunt themselves.

My critic continues "if birds consume as many cryptically colored animals, in proportion to their abundance as they do conspicuously colored ones, then they are evidently seeking the former in preference to the more easily found conspicuous animals." The fallacy in this argument from the point of view of the student of bird food is that birds have no difficulty whatever in finding cryptically colored forms. Scores of species of birds feed on scale insects, for instance, creatures as obscurely colored and as immovable as the bark on which they live. As birds can find these ultra-cryptic forms they surely can find any others.

A further remark from my reviewer is "butterflies and many grasshoppers, while, in flight, are among the most conspicuous of all insects. We should, therefore, expect them to be eaten by birds in greater proportion than many other insects." This is an expectation personal to Mr. O'Byrne, as conspicuous insects according to theory are "specially defended" by nauseous or noxious qualities.

"Again, most insects, after they have completed the task of reproduction, become more sluggish and less successful in hiding themselves." This would not seem to follow at all as sluggishness should conduce to quiet which is essential to protection by cryptic coloration. My reviewer adds "It is, therefore, absolutely necessary to know the circumstances of capture in order to judge the effectiveness of protective adaptations." Since the accumulation of any notable body of information complying with this requirement is impossible, the suggestion really is to relegate the study of the effectiveness of protective adaptations to the fields of the unknown and the unknowable, realms selectionists have always preferred to roam.

Mr. O'Byrne says, without warrant, that "Mr. McAtee has considered only a fraction of the resistance of the environment." Admittedly discussion of predators of every kind made up the bulk of my contribution, but parasites are mentioned throughout, and on pages 141-143, parasites, bacterial and fungal diseases, heat, cold, and other climatic factors are evaluated. There is no comfort to the selectionist in contemplating any of these factors of environmental resistance as all of them

are indiscriminate so far as protective adaptations are concerned. Chief attention was given to the only group—predators—that conceivably might exercise the degree of selection necessary for the development of protective adaptations in accordance with theory.

Again my critic says I have not considered all kinds of adaptations. I believe I did consider all kinds coming under the scope of my paper, *i.e.*, the so-called protective adaptations, but even were there some omission, it would have no significance. If it be admitted that predation tends to be in proportion to population (and it is true whether admitted or not), the effect of this practical indiscriminacy is the same in relation to all adaptations of whatever kind and that effect certainly tends to be non-selective. To fulfill the requirements of the theory of natural selection, it would have to be highly selective, and the data I presented in my paper leaves no doubt that it is only feebly if at all selective.

More philosophy from Mr. O'Byrne is "The destruction of animals by predaceous foes may be taken as the resultant of two factors, the defensive adaptations of the animals preyed upon—in structure, color, and behavior—and the aggressive adaptations of the attacking animals. . . . In like manner, the development of protective adaptations in animals preyed upon has been accompanied by improved adaptations for aggression in predators. The *status quo* has been maintained; forms unable to keep up with the procession have been left by the wayside for the paleontologists to ponder over." This implication that species have been exterminated by predators is without foundation. Fossil remains indicate nothing of the kind, and could not in the case of insects or other creatures eaten in their entirety by predators except by evidence from coprolites and that source decidedly is not an important one for our knowledge of fossil animals.

"Mr. McAtee dismisses the supposed difficulty of making identifications of Lepidoptera in bird stomachs by describing the fuzzy appearance of the material due to the presence in it of lepidopterous scales, and he says, further that identifications can often be made from wing venation in cases where none of

the original coloration remains. I wonder how often birds devour butterflies and moths, wings and all, as compared to the frequency with which they pull the wings off, and eat only the body. When they do eat the wings, the difficulty of making determinations would be greatly increased, and in many cases identification would be impossible."

Identification as Lepidoptera probably never fails for lack of evidence, as even if wings are discarded, the scales giving the characteristic appearance referred to are present in abundance as they clothe the entire body of these insects. If Mr. O'Byrne knows from his own observations that birds frequently discard the wings of butterflies, he knows more along that particular line than anyone else on earth. In my paper I expressly stated that "identification to species especially has lagged more in the case of lepidopterous items of food, than in those of any of the other larger orders of insects, due chiefly to poor condition of the remains of adults, and to lack of knowledge of larvae." (P. 55.) Over 70 per cent of the entire number of captures (18, 487) of Lepidoptera were named only to the order. It is very possible, therefore, that *Danais plexippus,* a "warningly colored" form Mr. O'Byrne especially mentions, was present in some of the stomachs but not identified.

The point, however, is of no consequence; the object of my paper was to present as fully as practicable information on the frequency of capture of animal forms by nearctic birds. That the results are damaging to theory should be credited to the facts not to the author. Mr. O'Byrne apparently accepts in the end what he denied in the beginning as he says, "That the food of birds is generally distributed among the taxonomic groups in proportion to the abundance of individuals and their availability to birds only shows that the majority of animals possess some kind of protective adaptation."

I must add that it certainly shows a great deal more. It shows that protective adaptations do not prevent practical indiscriminacy of predatory attack. Indiscriminacy is the antithesis of selection and with it as the guiding principle of predation, theories as to the origin of the so-called protective adaptations through natural selection collapse.

New Species of Buprestidae[1] (Coleoptera) with Notes Concerning Others.

By Edwin C. Van Dyke, University of California, Berkeley, California.

Acmaeodera nigrovittata new species.

Moderately robust, broad and short with disk of elytra flattened; head, prothorax and under surface aeneous, the prothorax sometimes with a small yellow spot in front of the hind angles, the elytra black or faintly aeneous and each elytron with two irregular yellow stripes, the inner extending in width from the second to the fifth stria and in length from near the base to the posterior two thirds where it commences to narrow and to curve inwards in a zigzaz manner towards the apex and unite with the outer yellow stripe, here approaching to within one interval of the suture, the outer stripe commencing near the base at its outer angle and continuing along the margin with a width of from one to three intervals to its union with the inner; the upper surface sparsely clothed with rather long more or less erect white hair and the under surface rather more densely clothed with much inclined white pile.

Head coarsely, closely punctured, somewhat longitudinally impressed at the middle, fifth antennal segment suddenly enlarged but less transverse than sixth.

Prothorax twice as wide as long, widest just back of middle, the sides almost straight and divergent to widest point then straight or slightly arcuate and convergent to anterior angles, the margin narrow and concealed from above, the disk coarsely, somewhat cribrately punctured, with a well defined median longitudinal impression ending in a deeper prescutellar impression and with deep foveae within the posterior angles.

Elytra slightly narrower at base than prothorax at widest point, with sides almost straight and gradually convergent to posterior two thirds thence arcuate and rapidly convergent to apex, the apical margins serrate; the disk with the first and second striae defined by rather small, elongate punctures, the others by very coarse and deep punctures, the inner intervals more or less flat, the outer three somewhat convex and with the striae separating them well defined, certain intervals also more or less punctured. Beneath rather coarsely punctured in

[1] This is the fourth paper of mine dealing with the Buprestidae published in Entomological News, the previous papers having appeared the volumes for 1916, pp. 405-412; 1918, pp. 53-58; and 1919, pp. 151-156, 186-190.

front and quite finely punctured behind. Prosternum emarginate in front.

Last ventral segment with preapical carina in a few specimens, absent in the majority. Length 8-9 mm., breadth 2.5-3.25 mm.

Holotype (No. 3756 Mus. Calif. Acad. Sci.) from Selma, Fresno Co., CALIFORNIA, June 4, 1929, collected by R. L. Usinger, and several designated *paratypes* from a series of fourteen specimens, eight from Selma, three from Mojave, California, April 10, 1929, E. P. Van Duzee collector, two from Cuyama Valley, Kern County, California, April 10, 1932, E. P. Van Duzee collector, and one from McKittrick, California, April 11, 1932, E. P. Van Duzee collector.

This striped species belongs in the group characterized by the emarginate prosternum. Its peculiar short and wide body will generally enable it to be readily separated from other vittate species. The striped phases of *acuta* have more irregular stripes, generally broken, the pronotal punctures finer and more separated, the prothorax less dilated and the body narrower and more elongate. *Acmaeodera lanata* Horn and *lineipicta* Fall, the latter probably a synonym of *biedermanni* Skinner, are larger, more elongate and with the prothorax less dilated while *quadriviltata* Horn and *gemina* Horn are very much smaller. These species also have a different type of prosternum.

Acmaeodera varipilis new species.

Small, subcylindrical and more or less blunt; head and pronotum aeneous, elytra bronzed or bronzed blue, sometimes black in females and with from ten to sixteen yellow spots arranged in rows, two to each elytron, when of the maximum number, two spots midway between base and middle, two at middle, two between middle and apex and two near apex, the inner basal and outer row being the first to disappear as reduction takes place, the underside bronzed; head and pronotum distinctly but not densely clothed with rather long decumbent white hair, changing to long scales on sides of pronotum, the elytral intervals each with a single row of small, much inclined, hooked, elongate white scales arising from fine punctures, the undersurface in males rather densely clothed with closely appressed white scales which have their free ends tuft like or much divided, so-called stellate scales, the vestiture of meta-

pleurae longer and hair like, in the females the vestiture of the prosternum is similar to that of the males but the afterbody except the last three ventral segments is densely clothed with long, silky white pile, the terminal segments with fulvous pile, more erect and curled forwards.

Head coarsely, closely punctured, front longitudinally shallowly sulcate, occasionally with callosities, clypeal margin broadly, shallowly emarginate; antennae with fifth segment suddenly dilated.

Prothorax twice as wide as long, apex slightly lobed in front, base wider than apex, markedly so in females, sides broadly arcuate, rapidly converging towards apex and base in males, almost parallel or but slightly converging towards base in females, the disk convex, coarsely, closely, cribrately punctured and shallowly impressed towards base in median line.

Elytra almost four times length of prothorax, umbones prominent, sides sinuate before middle, margin serrate apically, disk convex, striae with deeply impressed, large, round and approximate punctures, intervals more or less convex throughout in females, apically in males, and somewhat narrower than striae towards base.

Body beneath moderately coarsely, closely and deeply punctured in front, more finely and sparsely behind and also more shallowly in males. Males, length 6 mm. breadth 2; female 8 mm., breadth 3 mm.

Holotype male, allotype female (Nos. 3753 and 3754, Mus. Calif. Acad. Sci.) and paratype male and female, the type and one male paratype from TIBURON ISLAND, Gulf of California, July 5, 1921, the allotype from CARMEN ISLAND, Gulf of California, May 23, 1921, likewise the female paratype but taken two days earlier, and all collected by Mr. E. P. Van Duzee. Other specimens studied are a male from Finley, TEXAS, collected June 9, 1930, a second male from Oracle, ARIZONA, collected July 2, 1924, and a female from Cave Creek, Cochise County, Arizona, June 20, 1929, all collected by Mr. J. O. Martin; besides several specimens collected in Sabino Canyon and near Tucson, Arizona, by Mr. G. Hofer on *Acacia constricta*. These last are a bit more elongate than the others and with the elytral spots reduced in number, the inner basal and most of the outer row having disappeared, but in agreement with the type series in all other regards.

This species is closely related to *guttifera* Lec. (*versuta* Lec. ♂) and *squamosa*[2] Van Dyke, forming with them a small group which is quite characteristic of our Southwest. *Acmaeodera guttifera* Lec. is clothed, both above and beneath with hair, that on the dorsal surface erect; *squamosa* clothed on both surfaces with short, closely attached white scales, stellate beneath, except for the three terminal abdominal segments in the female; while *varipilis* has the elytra in fresh specimens ornamented with rows of fine, short, semierect, hooked scales and the underside clothed like *squamosa*.

Acmaeodera vanduzeei new species.

Elongate, subcylindrical; head and prothorax bronzed with cupreous reflections, elytra deep blue variegated with irregular more or less tortuous yellow maculations, the yellow color slightly dominating, the undersurface aeneous; the vertex and pronotum sparsely clothed with rather short white hairs which are suberect and curved forwards; the elytra with widely separated short white hair arranged in rows along the intervals and somewhat inclined backwards, and the front of head, sides of pronotum and entire underside of body excepting head densely clothed with closely appressed stellate white scales which give it a chalky appearance.

Head rather closely punctured with large, shallow, variolate punctures, feebly longitudinally impressed; the fourth segment of antennae suddenly enlarged.

Prothorax about one third wider than long, apex distinctly bisinuate, sides rather evenly and distinctly arcuate, side margin not evident from above, disk convex, shallowly canaliculate at middle and coarsely, shallowly, rather closely punctured.

Elytra narrower than prothorax, sides almost parallel, a bit sinuate at middle and rounded to apex, margin serrulate; disk convex, striae shallowly impressed and with rows of rather coarse, closely placed punctures, the umbones prominent.

Beneath coarsely, closely punctured in front, finely closely punctured behind, subapical carina not evident. Length 8 mm., breadth 3 mm.

Holotype (No. 3755 Mus. Calif. Acad. Sci.), a unique collected by Mr. E. P. Van Duzee on Angel de la Guardia Island, Pond Island Bay, Lower California (Gulf of California).

This species belongs with those having a truncate prosternum

[2] New species of Buprestidae (Col.) from the Western United States, with supplementary notes concerning others, Ent. News, vol. XXX (1919), pp. 186-187.

and should be placed close to the guttifera group. It is in fact but an enlarged and more elongate member of that group.

Chrysobothris cupreohumeralis new species.

Small, moderately elongate, not depressed, subopaque, dull blue, the front bronzed, occiput greenish, the elytra tending towards violet and with a cupreous patch in humeral region extending from base along sides to about the middle, the outer portion of middle and hind femora also a brilliant cupreous color, the head conspicuously and pronotum sparsely pubescent and the sides of meso and metathorax and abdomen rather densely clothed with appressed white pile.

Head with front somewhat flattened, distinctly and moderately closely punctured, without callosities, clypeal margin broadly shallowly emarginate at middle and obliquely truncate each side of incision, the eyes large and well separated; antennae quite bronzed, gradually more slender to tip, third segment somewhat triangular and not quite equal in length to the two following segments united, the fourth and succeeding segments transverse.

Prothorax about twice as wide as long, broadest back of middle, apex broadly shallowly lobed, base markedly trisinuate, sides almost straight and slightly divergent to posterior third then arcuate and convergent to base, dorsum evenly convex, rather coarsely, closely and evenly punctured, and with a few strigosities towards hind angles though without callosities, median line or sulcus.

Elytra but little wider than prothorax, sides almost straight and parallel to posterior third thence arcuate and convergent to individually rounded hind angles, margins posteriorly and apex distinctly serrulate, the disk convex, rather densely punctured, more coarsely and cribrately on basal area, broadly transversely impressed at basal third, the basal foveae alone impressed and but faintly, and only the inner costa evident and only posteriorly.

Body beneath rather coarsely, closely punctured in front, more finely on abdomen, lateral margins of last ventral segment distinctly serrulate, prosternum evidently lobed in front, and anterior femora without tooth. Length 6.5 mm., breadth 2.75 mm.

♀. Prosternum rather closely, coarsely punctured and slightly pilose, the apex of last ventral segment broadly shallowly emarginate and anterior tibiae straight and without dilatations.

Holotype (No. 3757 Mus. Calif. Acad. Sci.), a unique female,

collected at El Paso, TEXAS, April 27, 1927, by Mr. J. O. Martin.

This attractive species somewhat resembles *axillaris* Horn in color pattern and like that species belongs in Horn's Group I. It differs, however, by being much narrower, less flattened, color a more intense blue, front without median longitudinal line and callosities, clypeal emargination broader and shallower, the prothorax broadest posterior to middle, not anterior, the elytra more coarsely punctured, the basal impressions of same faint and not cupreous and the apices less coarsely serrate. The anterior femora are also not toothed, markedly so in *axillaris*, and the middle and posterior femorae brilliantly cupreous, not unicolorous with rest of ventral area, and the afterbody beneath densely clothed with white pile. No other species that I know of seems to approach it closely though it undoubtedly belongs in the same small complex with *piuta* Wick. and *carmelita* Fall.

(To be continued)

Osmia permorata Ckll. the Female of O. abnormis Cresson (Hymenoptera; Apoidea)

In a collection from near Ward, Colorado (June 2-9, 1933, H. G. and H. E. Rodeck) were seven male specimens of *Osmia abnormis* Cresson and two females of *O. permorata* Cockerell. Observations of mating behavior in the field show these to be sexes of the same species, *permorata* becoming a synonym of *abnormis*. The type of *permorata* was a female from Steamboat Springs, Colorado, and that of *abnormis* a male from "Colorado." *O. permorata* differed from *abnormis* in having black rather than red hair on the middle basitarsi.

The male of *abnormis* meets with difficulty in Cockerell's key (Univ. of Colo. Studies, XVI, 116, 1928) because of a spine on the apical margin of the first sternite and a projecting carina at the apical margin of the second, confusing the species with *nifoata* Ckll. in step 1 of the key.

It is of interest to note that in the series of seven males two show the pale yellowish pubescence on the thorax as described by Cresson, four show a reddish tinge on the posterior region of the thorax, and one has this posterior portion almost as bright fox red as is found in the female.

I am indebted to Professor Cockerell for the identification of these specimens.—HUGO G. RODECK, University of Colorado Museum, Boulder, Colorado.

A New Species of Pauropus from Iowa (Pauropoda).

By WILLIAM A. HILTON, Pomona College, Claremont, California.

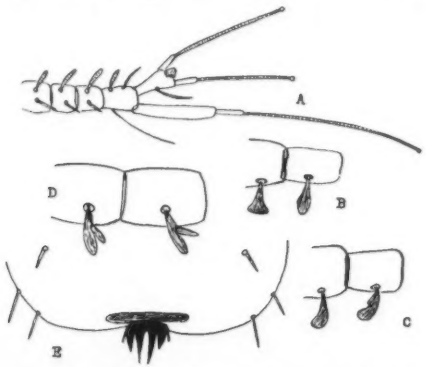
Pauropus medianus n. sp.

Length .92 mm., width of body at the widest, .2 mm.

Head—Length and breadth, .13 mm. It has three rows of knobbed hairs above or about 24 in all.

Back of the head there are two or three rows of knobbed hairs. The last of these are less clubbed. The next division of the body has four hairs in a cephalic row, four in a middle row and four in a caudal row. The next has two rows of three each. The next has three long hairs on each side. The last has four long hairs above. These last are all long and straight. The next to the last region of the body has six long ventral hairs and the last ventrally eight long hairs. Except for the last two regions and near the head ventral hairs were not abundant. The last plume hair was 1 mm. long; the others about half this length.

Antennae—Length .25 mm. The base was 0.076 mm. long. The ramus bearing the globulus is about half as long as the other. The two flagellae of the globulus ramus are of about equal length and two thirds as long as the long flagellum. The globulus is small, sessile and surrounded by minute appendages. Each basal joint of the antennae has two knobbed hairs.



Parts of *Pauropus medianus* n. sp. A. Antenna. B. Two basal segments of first leg with appendages. C. Same as last from second leg. D. Same as last from first leg. E. Caudal Plate.

Legs—The legs are of the following lengths: First, .18 mm.; Second, .21 mm.; Third, .23 mm.; Fourth, .24 mm.; Fifth, .26 mm.; Sixth, .27 mm.; Seventh, .31 mm.; Eighth, .31 mm.; Ninth, .36 mm. The Claws are small. The two basal joints of all the legs bear short, scale-like hairs which are simple on the upper legs. The next to the last and the last legs bear double hairs of a peculiar type on the two basal joints. The relative lengths of the leg joints are as follows, beginning with the shortest joint: First leg: 3-(1-2-4)-5. Second leg: 5-(1-3-4)-6. Third leg: 5-(1-2-3-4)-6. Fourth leg: 5-(1-2-3)-4-6. Fifth leg: 5-(2-4)-3-1-6. Sixth leg: 5-3-(1-4)-2-6. Seventh leg: 5-(3-6)-(1-2-4). Eighth leg: 5-3-(1-2)-4-6. Ninth leg: (1-2-3)-4-5.

Distinctive Features: The anal plate has six central points. There are four club-shaped hairs on the under side of the first body division back of the head, but none like them farther back. The last two legs have jointed scales or spines on the first two basal segments. Many of the more caudal legs have appendages that have a tendency to branch.

The *type* is a male in the Pomona College Collection. This was compared with others from the same locality. Specimens were received from H. B. Mills, Ames, Iowa. Specimens from other parts of Iowa sent by Mills were all of this species. Some of these were immature. They were collected during October, November and December, 1932. They seem nearest to *P. caudaspinosus*.

Two New Arizona Coleoptera (Buprestidae and Cerambycidae).

By J. N. Knull, Hummelstown, Pennsylvania.

Agrilus parapubescens n. sp.

Form slender, aeneous, beneath cupreous, more shining than above, sides of pronotum, humeral depressions of elytra and disk of elytra along suture near apex, clothed with white recumbent pubescence; front cupreous.

Head convex, median depression not evident; surface granulose, becoming rugose on occiput; clothed with white recumbent pubescence; antennae short, reaching to slightly beyond middle of pronotum, serrate from the fifth joint.

Pronotum wider than long, wider in front than at base; when viewed from the side the marginal and submarginal carinae are broadly arcuate in front and are not united at any point; a

third short carina starting near the apex runs parallel to the marginal carina to beyond the middle of the pronotum; disk moderately convex, an oblique lateral depression extending to the lateral margin on each side, prehumeral carinae long and prominent; surface transversely rugose, punctate between rugae. Scutellum transversely carinate.

Elytra wider than the pronotum at base, slightly wider back of middle than at base; sides constricted in front of middle, expanded behind middle, obliquely narrowed to tips which are separately rounded and serrulate; disk flattened along sutural margins which are elevated; surface densely imbricate-punctate, each puncture containing a recumbent hair.

Abdomen beneath sparsely finely punctate, first and second segments only slightly flattened; pygidium carinate, carina not projecting. Prosternum broadly rounded, a dense median line of pubescence extending from pronotum to first abdominal segment; ventral portions of pro-, meso- and metasternum with dense patches of recumbent white pubescence.

Anterior and middle tibiae mucronate on inner margin at apex. Posterior tarsi about as long as the tibiae, first joint as long as the three following joints. Tarsal claws similar on all feet, cleft, inner portions not turned inward.

Length 4 mm.; width 1 mm.

Described from a single male labeled Wilcox, ARIZONA, June, 1933, D. K. Duncan, collector. *Type* in writer's collection.

According to Fisher's key,[1] this species would run to *A. pubescens* Fisher. It is quite distinct from all of the other forms in this group by the general appearance and the presence of the extra carinae parallel to the lateral carinae.

Elaphidion (Anoplium) hoferi n. sp.

Slender, light brown in color, resembling *A. cinerescens* Lec. in size, color and general appearance.

Head with large, irregularly placed punctures; eyes prominent, coarsely granulate; antennae of male extending to slightly beyond the apex of elytra when laid back over dorsal surface, those of female not quite reaching tips, scape stout, second joint very short, third joint longer than fourth, fifth joint longer than fourth, sixth joint shorter than fifth, joints six to ten gradually decreasing in length, last joint longer than tenth; joints three and four with short spines; antennae coarsely punctured, pubescence fine, short, scattered long flying hairs.

[1] W. S. Fisher, U. S. National Museum, Bull. 145, pp. 1-347, 1928.

Pronotum slightly broader than long, of about equal width at base and apex, widest in the middle; surface covered with a network of intervening lines which tend to form large shallow punctures, each of these large punctures containing a small puncture from which arises a moderately long hair. Scutellum densely pubescent.

Elytra about three times as long as broad; sides nearly parallel to apical fourth, then broadly rounded; apices truncate; surface densely coarsely punctured, punctures becoming smaller toward apex; a moderately long hair arising from each depression.

Ventral surface lighter in color than above; punctures of abdomen small, not prominent.

Length 6.5 mm.; width 2 mm., paratypes varying to 8 mm. in length and 2.5 mm. in width.

The female differs from the male in length of antennae and by having a wider thorax.

Described from five specimens labeled Tucson, ARIZONA, June 4, G. Hofer collector. Male *type* and *paratypes* in writer's collection.

The species comes close to *A. cinerescens* Lec. and undoubtedly stands under that name in some collections.

A Summary of the Sucking Lice (Anoplura).

By G. F. FERRIS, Stanford University, California.

For several years the writer has been engaged upon a series of papers which have been intended—when and if completed—to constitute a systematic monograph of the Order Anoplura, the sucking lice. Thus far six parts[1] have been published, these completing the systematic review of all but a small number of genera and about twenty species. The remaining portions of the series are either entirely ready for publication or in condition to be rounded up rapidly but will probably not appear in print for some time to come owing to the existing financial situation. Because of the prospects of delay it seems justifiable to present a general summary of the results which appear from this study.

First as to the status of the Order. At one time the two

[1] Stanford University Publications, University Series, Biological Sciences, Vol. 2. Six parts, 470 pages, 276 figs.

groups of the biting and the sucking lice were united into a single Order under the name Anoplura. They were later separated and for a time this name disappeared, the biting lice being recognized as the Order Mallophaga while the sucking lice were attached to the Hemiptera as a suborder, variously known as the Suctoria or Parasita. Once more they were restored to ordinal rank, various names, Pseudorhyncota, Lipognatha, Ellipoptera, Siphunculata, being employed. And again the tendency to unite the two groups into a single Order has appeared, with resulting question as to the proper name to be employed.

Without entering into the arguments, the simple conclusion may be stated that in the writer's opinion the two groups may justifiably be recognized as distinct Orders and that for the sucking lice the name Anoplura may reasonably be retained. While without much doubt the two groups of lice are related, just as the Lepidoptera and Trichoptera are related, the differences between them are trenchant, extending much farther than the differences in mouthparts, and are not bridged by any known form. Whatever difficulty there may be in expressing this relationship properly may be ascribed to the defects of our traditional nomenclatorial system which attempts to make a very limited number of categories express a very large number of degrees of relationship. To place the Mallophaga and Anoplura under a single Order will very greatly complicate the difficulties encountered in formulating an expressive and balanced intra-ordinal classification.

This intra-ordinal classification presents problems concerning which the writer does not desire to express definite opinions until all the evidence to be derived from comparative morphological studies is in and has been carefully weighed. That the old classification of a single family, the Pediculidae, is unduly limited is evident. But the recognition of all the families that have been proposed, especially the Haematopinoididae and the Phthiridae, appears possible only by concentrating attention upon what are probably more or less superficial differences rather than upon fundamental resemblances. The consistent

use of criteria of the grade employed in establishing these two would result in the establishment of a considerable series of "families" based upon little more than generic or super-generic peculiarities of no deep-seated significance. The writer holds as a definite principle that it is the underlying thread of continuity, rather than the varying beads which are strung upon it, that should be followed if a balanced and logical classification is to be achieved.

One family which has been named in the Anoplura is valid enough but does not belong to this Order. This is the family Haematomyzidae, based upon the single species *Haematomyzus elephantis* Piaget. This has been discussed elsewhere by the writer and referred to a suborder, the Rhynchophthirina, of the Mallophaga.

One genus, *Acanthophthirius* Perkins, with a single species, *A. etheldredae* Perkins, is based upon an immature mite.

The total number of known species of Anoplura can not be stated precisely. Several named forms are still in doubt, owing to the inadequacy of original descriptions, but may possibly be recognizable at some time through circumstantial evidence or the rediscovery of the types, and some synonyms may prove to be involved. Furthermore, differences of opinion as to what constitutes a species are of considerable significance, especially in some genera, such as *Pediculus*, and considerably modify the total number. On the basis of the criteria of specific distinctness which are employed by the writer, the number of species is 200 plus or minus 2 or 3. Other authors might possibly recognize as many as 215.

The rate of growth in our knowledge of the group may be seen from the following figures. The Dalla Torre catalogue of 1909 recognized 65 species and the writer's catalogue of 1916 included 120. Both catalogues include a number of synonyms and there are some omissions in each, the synonyms, however, over-balancing the omissions so that the actual number of known species was in each case less than the number cited. Our knowledge of the species of Anoplura has therefore more than tripled since 1909.

It is interesting to speculate upon what percentage of the

existing species may now be known. Some rough idea may be formed by taking into consideration the known facts of distribution.

It may be taken as definitely established that certain large groups of mammals do not harbor sucking lice, these including the bats, the marsupials, the land carnivores (with the anomalous exception of certain Canidae), a considerable portion of the insectivores and certain families of rodents such as the Geomyidae and Erethizontidae. The groups upon which Anoplura may normally be expected to occur are the Primates, most of the rodents and the "ungulates." If we take, for example, the mammals of North America as they appear in a recent catalogue, we find that only 59% of the recognized species and subspecies are members of groups subject normally to infestation. This percentage will vary in different parts of the world, being exceedingly low in Australia with its marsupial fauna and possibly higher in Africa with its large numbers of rodents, Primates and "ungulates." Unfortunately for our purposes, no satisfactory estimate of the number of known living species of mammals in the whole world is available. The writers of two recent general zoological texts present estimates, the origins of which are not indicated, one of 7500 and the other of 15000! Trouessart in 1904 listed 9377 species, this, however, including fossil forms. There has been much activity among mammalogists since that date, particularly in the naming of subspecies and undoubtedly a great deal of synonymy is involved. Perhaps the number of known species is in the neighborhood of 10,000 and this will not be increased by many hundreds more in the future.

On this basis there are perhaps 6000 species of mammals on which Anoplura may be expected to occur. But the number of possible species of Anoplura can be no where near that figure. A single Anopluran species may range over a large number of closely related mammal species, as is the case, for example, with *Neohaematopinus sciurinus* Mjöberg, which has been recorded from about 25 host species and may be expected to occur on perhaps 100, or *Enderleinellus suturalis* (Osborn) which is recorded from 15 or more species of citelline squirrels

and probably occurs upon 50 or more. On the other hand, the situation is complicated by the fact that as many as three species of Anoplura may occur upon a single host species, as is the case with *Enderleinellus, Hoplopleura* and *Neohaematopinus* on *Sciurus* or *Haematopinus, Linognathus* and *Solenopotes* on domestic cattle, or the customary occurrence of species of both *Polyplax* and *Hoplopleura* upon many rodents.

But even so the number of Anopluran species relative to the number of possible hosts is small. The number of known possible hosts in North America is about 1300 species and subspecies. The number of Anoplura, from these hosts, including those now known and certain others not yet collected but the existence of which is almost certain, will scarcely exceed 50. On this basis the number of Anopluran species is about 4% of the number of possible hosts. Extending this to the world, we would have about 240 as the probable number of Anoplura. This is evidently too small a figure, but even so the writer would estimate that there are certainly not over 500 species of Anoplura in the world and in all probability the number is considerably less.

(To be continued)

Zur Systematik der Oribatiden (Acarina) nach Willmann (May, 1930).

By Arthur Paul Jacot.

Willmann's remarks on my "Genera of Pterogasterine Oribatids" (1929) are in some instances based on misunderstanding which I hope to clear.

I believe in using the descriptions and figures of the old authors, but they must be applied to that species which most closely fits the description or figure, irrespective of earlier redeterminations. For instance *Hoplophora laevigata* Koch cannot be applied to a rough-sculptured species. Likewise one cannot apply the name *O. orbicularis* Koch to an elongate species.

Oudemans (1926), as I have already shown (1932), makes *Acarus geniculatus* Linné 1758 identical with a species

described from England by another author, and bases his interpretation of Linné's species on the assumption that the two are identical. *A. geniculatus* Linné can only be reidentified on the basis of Linné's description. Anyone else's identification of a species with Linné's, contemporary or later, was probably another species. Even as late as 1905, acarologists were erroneously identifying species from neighboring regions. Linné's *A. geniculatus* is undoubtedly the largest and commonest species on dead branches about Utrecht. Why Oudemans should regard Shaw's *A. coleoptratus* (1800) as Linné's *A. geniculatus* is left to our imagination. This is not science.

Sphaerozetes. Willmann writes that my statement is not in the *sense* of Berlese. No one can tell what Berlese's sense was. Five persons might have five different ideas as to what Berlese's sense was. The only final sense is what Berlese *printed*. He was responsible for what he printed. We must abide by the printed page. This is also according to International Rules. Thus my statements on page 419 are technically correct.

Trichoribates. Murcia trimaculata Koch is not at all certainly the nymph of *Oribates setosus*. Michael merely said it probably was. Certainly Koch's figure (fasc. 3/21) and Michael's (pl. 7, fig. 4) do not resemble each other, for Michael's is four spotted and has conspicuous bristles on posterior edge and on dorsal face of notogaster. Michael also said *Z. ephippiatus* was probably the nymph of *O. fuscipes*, but *Zetes morticinus* is much more probably the nymph, compare Koch's figure (fasc. 31/14) with Michael's (pl. 7, fig. 2).

As a matter of fact this has nothing to do with the Italian species which I named *S. berlesei*. Willmann talks as if I renamed the German species (for what reason I cannot understand); it is the Italian species which needed renaming and which I therefore named after the Italian acarologist.

Then through some other occult form of reasoning Willmann says the type of Trichoribates is *M. trimaculata* Koch when I distinctly appointed *S. berlesei* (the Italian species). It appears very much as if Willmann did not understand my English.

Lepidoribates. I wrote my statement concerning the synonymy of this genus in 1928. It was published in 1929. Sell-

nick's separate reached me February 6, 1929. Some claim that a few copies were circulated in 1927. This is a bogus date, as the work did not enter into circulation, so that even specialists on Oribatids could get them, until 1929. The date of issue is not the date when a few advanced copies were sent to two or three acarologists. Thus Willmann's remark is short-sighted. Whether I saw Sellnick's statement or not, I should have included my remarks to make my paper complete.

Tegoribates. Willmann's remarks under this head are his only worthwhile contribution in this paper.

Heterozetes. My knowledge of this genus I based on Willmann's original statement and figures. Here he separated the subgenus because the type species had but one hook on legs 1. This character is of specific or even subspecific value at most. I have shown that it is not even of subspecific value in Pseudotritia (1933). As Willmann points out in his later recharacterization (1931, p. 165) this genus is quite closely related to Ceratozetes and may still be regarded as a subgenus. It is encouraging to realize that I have caused Willmann to do a little more detailed and fundamental observing.

Punctoribates. Of course it is entirely not understandable that this genus is closely related to Sphaerozetes when one overlooks almost all I said under this genus, namely that *O. orbicularis* Koch is not *O. orbicularis* Michael but more like *O. lapidaria* Michael. Sphaerozetes is a genus of spherical oribatids with short cephaloprothorax and not as it has formerly been erroneously made out. Why cannot Willmann study Koch's figure and see that Michael's reidentification is wrong?

Willmann's idea of Minunthozetes again is all wrong. He figures it (1931, p. 173) as having a translamella. Michael's figure of the genotype (1884, pl. 12, fig. 6) is without translamella. Willmann's Minunthozetes is Jurabates.

If Willmann does not care to regard Mycobates as subgenus of Limnozetes, why worry? I did not so regard it on page 423 but placed it so in the key. How eccentric!

As to Zetes and Galumna, see my forthcoming revision of the subfamily.

Acarus coleoptratus is not type of Notaspis because Hermann never so much as used the term *type* (or even example).

LITERATURE CITED.

JACOT, A. P., 1929 (Oct.-Nov.), Genera of Pterogasterine Oribatidae (Acarina), Trans. Am. Micr. Soc., vol. 48, pp. 416-430.

SAME, 1932, Concerning Oudemans' "Kritisch Historisch Overzicht der Acarologie" in its bearing on nomenclature of the Mossmites, Psyche, vol. 39, pp. 59-63.

SAME, 1933 (April), Phthiracarid Mites of Florida, Jour. Elisha Mitchell Sci. Soc., vol. 48, pp. 232-267, pls. 19-22.

KOCH, CARL LUDWIG, 1835, Deutschlands Crustaceen, Myriapoden und Arachniden, Regensburg.

LINNÉ, CHARLES, 1758, Systema Naturae, ed. 10, vol. 1.

MICHAEL, ALBERT DAVIDSON, 1884, British Oribatidae, vol. 1, xi+336 pp., 24+A—G pls.

OUDEMANS, ANTHONIE CORNELIS, 1926 (Oct.), Kritisch Historisch Overzicht der Acarologie, Eerste Gedeelte, 850 B.C. to 1758; in: Tijd. voor Ent., vol. 69, supplement, 500 pp., 70 figs.

SHAW, GEORGE and FREDERICK P. NODDER (Illustrator), 1800 (July 1), The Naturalist's Miscellany, vol. 11, pl. 440.

WILLMANN, CARL, 1930 (May), Zur Systematik der Oribatiden, Zool. Anz., vol. 89, heft 1/2, pp. 22-28.

SAME, 1931, Zur Systematik der Oribatiden. Bemerkungen zu den letzten Veröffentlichungen von A. P. Jacot, Zool. Anz., vol. 89, helf ½, pp. 22-28.

Entomological Literature

COMPILED BY LAURA S. MACKEY UNDER THE SUPERVISION OF E. T. CRESSON, JR.

Under the above head it is intended to note papers received at the Academy of Natural Sciences, of Philadelphia, pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species will be recorded.

The **figures within brackets** [ ] refer to the journal in which the paper appeared, as numbered in the list of Periodicals and Serials published in our January and June issues. This list may be secured from the publisher of ENTOMOLOGICAL NEWS for 10c. The number of, or annual **volume**, and in some cases the part, heft, &c. the latter **within** ( ) follows; then the pagination follows the **colon** :

All continued papers, with few exceptions, are recorded only at their first installments.

(*) Papers containing new forms or names not so stated in titles, have an * within parentheses thus (*) following the pagination of reference to paper.

(S) Papers pertaining exclusively to neotropical species, and not so indicated in the title, have the symbol (S) at the end of the title of the paper.

For records of Economic Literature, see the Experiment Station Record, Office of Experiment Stations, Washington. Also Review of Applied Entomolog, Series A, London. For records of papers on Medical Entomology, see Review of Applied Entomology, Series B.

Note. Titles of papers containing new forms or new names will be indicated by an asterisk within parentheses at end of reference, (*).

Papers published in the Entomological News are not listed.

GENERAL.—Berland, L.—Voyageurs d'autrefois et insectes historiques. [Livre du Cent. Soc. Ent. Fr.] 1932: 157-166, ill. **Bultingaire, L.**—Les insectes dans la collection des Vélins du Muséum. [Livre du Cent. Soc. Ent. Fr.] 1932: 87-94, ill. **Essig, E. O.**—The value of insects to the California Indians. [76] 1934: 181-186, ill. **Klots, A. B.**—Some remarks on mimicry. A series dealing with the fundamentals of entomology. [Ward's Ent. Bull.] 2: 1; 4. **Lameere, A.**—Un peu de systématique. [Livre du Cent. Soc. Ent. Fr.] 1932: 593-596. **Lesne, P.**—Les formes d'adaptation au commensalisme chez les Lyctites. [Livre du Cent. Soc. Ent. Fr.] 1932: 619-627, ill. **Maeterlinck, M.**—Immortalité de l'insecte. [Livre du Cent. Soc. Ent. Fr.] 1932: 425-426. **Méquignon, A.**—Latreille et le génotype. [Livre du Cent. Soc. Ent. Fr.] 149-156. **de Peyerimhoff, P.**—La Société Entomologique de France (1832-1931). [Livre du Cent. Soc. Ent. Fr.] 1932: 1-86, ill. **Popenoe, E. A.**—Obituary. By G. A. Dean. [103] 7: 36. **Saylor, L. W.**—Collecting notes. [55] 9: 188. **Sherborn & Griffin.**—On the dates of publication of the natural history portions of Alcide d'Orbigny's "Voyage Amérique méridionale." [75] 13: 130-134.

ANATOMY, PHYSIOLOGY, ETC.—André, M.—La sécrétion de la soie chez les Acariens. [Livre du Cent. Soc. Ent. Fr.] 1932: 457-472, ill. **Balachowsky, A.**—La theorie des "Places vides" et le peuplement des végétaux par les Coccidae. [Livre du Cent. Soc. Ent. Fr.] 1932: 517-522. **Bangerter, H.**—Mücken-metamorphosen V. [56] 12: 248-259. **Brolemann, H. W.**—Les organes postvulvaires de quelques Chordeumoides (Myriapoda Diplopoda). [Livre du Cent. Soc. Ent. Fr.] 1932: 281-284, ill. **Bromley, S. W.**—Courting and mating performances of an asilid fly (Heteropogon). [5] 40: 144. **Bugnion, E.**—Les organes buccaux et le pharynx des Pompiles Brésiliens du genre Pepsis. [Livre du Cent. Soc. Ent. Fr.] 1932: 415-424, ill. **Cappe de Baillon, P.**—Formations multiples d'origine embryonnaire. [Livre du Cent. Soc. Ent. Fr.] 1932: 265-271. **Dumitresco & Dornesco.**—Les constituants cytoplasmiques des cellules nerveuses des araignées. [77] 114: 1350-1352, ill. **Emerson, A. E.**—Conditioned behavior among termites. [5] 40: 125-129. **Fage, L.**—Les branchies accessoires, les oostégites et la sexualité. [Livre du Cent. Soc. Ent. Fr.] 1932: 127-138, ill. **Flanders, S. E.**—Heat production and limitation of densities in Sitotroga populations. [7] 26: 529-535. **Fulton, B. B.**—Notes on Habrocytus cerealellae, parasite of the Angoumois grain moth. [7]

26: 536-553, ill. **Gambrell, F. L.**—The embryology of the black fly, Simulium pictipes. [7] 26: 641-671, ill. **Grandi, G.**—Lo studio comparato della morfologia e dell' etologia negli insetti a regime specializzato e la sua importanza per la biologia generale. [Livre du Cent. Soc. Ent. Fr.] 1932: 567-570. **Hillemann, H. H.**—Contributions to the morphology of the nervous system of the mature larva of Papilio polyxenes. (Papilionidae). [7] 26: 575-585, ill. **Hoffmann, A.**—Les caractères sexuels secondaires des Trachyphloeus de France et de Corse. [Livre du Cent. Soc. Ent. Fr.] 1932: 233-243, ill. **Husain & Roonwal.**—The Micropyle in Schistocerca gregaria and some other Acridiidae. [Indian Jour. Agric. Sci.] 3: 639-645, ill. **Jacot, A. P.**—Aparity among the Oribatidae (Acarina). [4] 65: 263-264. **Lutz, F. E.**—The "Buckwheat Problem" and the behavior of the honey-bee. [40] 688: 10pp. **MacLeod, G. F.**—Effects of ultra violet radiations on the bean weevil, Bruchus obtectus. [7] 26: 603-615, ill. **Mail, G. A.**—Reaction to mosquito bites following treatment for cold in head. [68] 79: 140. **Malouf, N. S. R.**—Studies on the internal anatomy of the "Stink Bug," Nezara viridula. [Bull. Soc. R. Ent. Egypte] 1933: 96-119, ill. **Nixon, G. E. J.**—Two notes on the behaviour of Volucella pellucens in its association with the wasps Vespa vulgaris and Vespa germanica. [8] 70: 17-18. **Paddock, W.**—Spermatogenesis in Chrysochus auratus. [Trans. Kansas Acad. Sci.] 36: 275-282, ill. **Pérez, C.**—Formes des bourgeons de régénération des appendices thoraciques chez quelques Crustacés Decapodes. [Livre du Cent. Soc. Ent. Fr.] 1932: 473-483, ill. **Rabaud, E.**—Construction et structure de la toile d'Argiope bruennichi. [Livre du Cent. Soc. Ent. Fr.] 1932: 523-535. **Rivnay, E.**—The tropisms effecting copulation in the bed bug. [5] 40: 115-120, ill. **Roubaud, E.**—Les phénomènes d'inertie évolutive chez la mouche verte commune "Lucilia sericata." [Livre du Cent. Soc. Ent. Fr.] 213-224, ill. **Sabrosky, Larson & Nabours.**—Experiments with light upon reproduction, growth and diapause in grouse locusts (Acrididae, Tetriginae). [Trans. Kansas Acad. Sci.] 36: 298-300. **Sharga, U. S.**—On the internal anatomy of some Thysanoptera. [36] 81: 185-204, ill. **Vandel, A.**—Le sexe des parasites dépend-il du nombre d'individus renfermés dans le même hôte? [Livre du Cent. Soc. Ent. Fr.] 1932: 245-252. **Yeager & Knight.**—Microscopic observations on blood coagulation in several different species of insects. [7] 26: 591-602, ill. **Zacher, F.**—La Biocénose des greniers, moulins et dépôts, ses rapports avec son habitat extérieur, et ses modifications à la suite

de l'evolution du commerce mondial. [Bull. Soc. R. Ent. Egypte] 1933: 68-75.

ARACHNIDA AND MYRIOPODA.—Lawson, P. B.—Notes on the life history of the hour-glass spider. [7] 26: 568-574. **Roewer, C. F.**—Solifuga, Palpigrada. [Bronns Klass. Tierreichs] 5, (4): 321-480, ill.

THE SMALLER ORDERS OF INSECTS.—Calvert, P. P.—Two Mexican species of Palaemnema (Agrionidae). [1] 59: 377-381. **Esben. Petersen, P.**—New and little-known Neuroptera [Videnskab. Meddel. Dansk Naturhist. Foren. Kobenhavn] 94: 109-123, ill. **Grassé, P.**—Observations et remarques sur les migrations d'Odonates. [Livre du Cent. Soc. Ent. Fr.] 1932: 657-668. **Hilton, W. A.**—Pauropoda from New Mexico. [7] 26: 554-556, ill.(*) **Hilton, W. A.**—Western Symphyla. [7] 26: 557-559, ill.(*) **Hood, J. D.**—Three new species of thrips from the western United States. [55] 9: 173-182, ill.(*). **McDunnough, J.**—New Ephemeroptera from the Gaspe peninsula. [4] 65: 278-281, ill.(*). **Moulton, D.**—The Thysanoptera of South America. [105] 3: 447-458. **Navas, R. P. L.**—Insectos de la Argentina. [Rev. Acad. Cien. Zaragoza] 16: 87-120, ill.(*).

ORTHOPTERA.—Alexander, G.—Some relations between altitude and the distribution of Acrididae in Colorado. [7] 26: 586-590. **Ander, K.**—Ueber Anisoura nicobarica m., eine bemerkenswerte laubheuschrecke aus der familie Gryllacrididae (Saltatoria). [56] 12: 217-230, ill. **Beier, M.**—Zwei neue Orpacophora-arten aus Peru (Tettigon.). [56] 12: 239-244, ill.(*). **Cooper, K. W.**—Observations on Doru aculeatum (Dermaptera). [19] 28: 216, ill. **Hebard, M.**—Studies in Orthoptera which occur in North America north of the Mexican boundary. [1] 59: 363-375, ill.(*). **Hebard, M.**—Dermaptera and Orthoptera in the Kansas State College Collection. [103] 7: 25-36.

HEMIPTERA.—Ball, E. D.—Notes on the Fulgoridae with some new species. [5] 40: 145-150.(*). **Beamer & Tuthill.**—Some new species and a new genus of deltocephaloid leafhoppers (Cicadellidae). [103] 7: 1-24, ill.(*). **Blatchley, W. S.**—Notes on a collection of Heteroptera taken in winter in the vicinity of Los Angeles, California. [1] 60: 1-16.(*). **Bromley, S. W.**—Cicadas in Texas. [5] 40: 130. **da Fonseca, J. P.**—Tres especies novas de Membracidae. [105] 3: 441-446, ill.(*S). **Lawson, P. B.**—The genus Fitchiella (Fulgoridae). [19] 28: 194-198, ill.(*). **Poche, F.**—Ueber den nomenklatorischen status der gattungsnamen in Latreilles "Familles Naturelles du Règne

Animal" im allgemeinen und über den giltigen gattungsnamen für Cicada plebeja im besonderen. [56] 12: 326-331, ill. **Usinger, R. L.**—New distributional and host plant records of Heteroptera for California. [55] 9: 171-172. **Usinger, R. L.**—Two new records of Arizona Hemiptera. [55] 9: 182.

LEPIDOPTERA.—Bates, M.—The pericopid genus Composia. [5] 40: 121-124.(*). **Benjamin, F. H.**—Notes on Phalaenidae. [55] 9: 145-150.(*). **Bouvier, E. L.**—Sur la classification des Saturnioïdes de la famille des Hémileucides. [Livre du Cent. Soc. Ent. Fr.] 225-231, ill. **Forbes, W. T. M.**—Notes on Ecpantheria (Arctiidae). [7] 26: 560-562. **Gunder, J. D.**—Anthocharis sara race stella. [55] 9: 150-152.(*). **Hoffmann, F.**—Beiträge zur lepidopterenfauna von St. Catharina. [17] 51: 13-15, cont. **Kea, J. W.**—Food habits of Tineola uterella. [39] 17: 66. **Klots, A. B.**—New records of Lepidoptera from New York. [19] 28: 203-210. **Latham, R.**—Lepidoptera records from Orient, Long Island, N. Y. [19] 28: 198. **Meiners, E. P.**—Euerythra phasma in Missouri (Arct.). [19] 28: 187. **O'Byrne, H.**—A migratory flight of Catopsilia eubule (Pieridae). [5] 40: 131-136. **Wickwire & Calale.**—Notes on Tropaea luna, Actias selene and their hybrids. [4] 65: 265-268, ill. **Williams & Bell.**—Studies in the American Hesperioidea. II. On the synonymy and genitalia of some species. [1] 60: 17-29, ill.

DIPTERA.—Aldrich, J. M.—A remarkable new genus of Tachinidae from Brazil. [105] 3: 437-441, ill.(*). **Curran, C. H.**—Review of the tachinid genus Calodexia. [40] 685: 21pp.(*). **Curran, C. H.**—Some North American Diptera. [40] 682: 11pp.(*). **Czerny, L.**—Ergänzungen zu meiner monographie der Helomyziden. [56] 12: 236-238.(*). **Davis, N. C.**—Notes on some South American mosquitoes. [7] 26: 619-639, ill. **Duda, O.**—Neue und bekannte neotropische Chloropidae des U. S. National-Museums. [56] 12: 192-209, cont.(*). **Edwards, F. W.**—Die ausbeute der deutschen Chaco-Expedition. 1925-26. Simuliidae (Melusinidae). [56] 12: 210-211. **Felt, E. P.**—A new Lestodiplosis. [5] 40: 113-114.(*). **Kumm, H. W.**—Mosquitoes breeding in Bromeliads, at Bahia, Brazil. [22] 24: 561-573, ill.(*). **Leonard, A. B.**—Notes on larvae of Cuterebra sp. (Oestridae) infesting the Oklahoma cottontail rabbit. [Trans. Kansas Acad. Sci.] 36: 270-274, ill. **Parent, O.**—Etude sur les types de Dolichopodides exotiques de Francis Walker, conservés au British Museum.

[75] 13: 1-38, ill. **Theodor, O.**—A note on Phlebotomus vexator. [107] 2: 274-276, ill. **Van Duzee & Curran.**—Key to the females of Nearctic Dolichopus. [40] 684: 17pp. **Van Duzee & Curran.**—Key to the males of Nearctic Dolichopus. [40] 683: 26pp.

COLEOPTERA.—Bernhauer, M.—Neue Staphyliniden aus Argentinien. [105] 3: 517-524.(*). **Bierig, A.**—Sobre Paederinae nuevos y poco conocidos de la América Central. [105] 3: 475-517, ill.(*). **Blaisdell, F. E.**—Note regarding Euschides cressoni. [55] 9: 152. **Borgmeier, T.**—Um novo hospede de Eciton (Holopone) schlechtendali (Staphyl.). [105] 3: 472-475, ill.(*S). **Cooper, K. W.**—A new species of Staphylinus. [4] 65: 264-265.(*). **Fall, H. C.**—On two species of Ludius. [19] 28: 188-192.(*). **Gaines, J. C.**—Notes on Texas Coccinellidae. [19] 28: 211-215. **Hatch, M. H.**—Ptinus tectus in America. [19] 28: 200-202. **Hendrickson, G. O.**—Some Mordellidae of Iowa Prairies. [19] 28: 193. **Hinton, H. E.**—Two coleopterous families new to Mexico. [55] 9: 160-162(*). **Hopping, R.**—New Coleoptera from western Canada. [4] 65: 281-286.(*). **Jeannel, R.**—Révision du genre Limnastis (Carabidae). [Livre du Cent. Soc. Ent. Fr.] 1932: 167-187, ill. (*S). **Latham, R.**—Xylorycetes satyrus. [19] 28: 202. **Leach, E. R.**—Two old and two new Pleocomas. [55] 9: 184-187.(*). **Liebke, M.**—Die amerikanischen arten der gattung Zuphium (Carab.). [105] 3: 461-472.(*). **Linsley, E. G.**—A European longicorn new to California (Cerambycidae). [55] 9: 170. **Linsley, E. G.**—New longicorn beetles of the subfamily Lamiinae (Cerambycidae). [19] 28: 183-185.(*). **Melzer, J.**—Nota previa sobre um longicorneo interessante dos Andes da Argentina (Cerambyc.). [105] 3: 459-461, ill.(*). **Mutchler, A. J.**—New species of Carabidae from Puerto Rico. [40] 686: 5pp.(*). **Park, O.**—A new species of Pselaphidae from Costa Rica. [7] 26: 563-567, ill.(*). **Saylor, L. W.**—Attraction of beetles to tar. [55] 9: 182. **Van Dyke, E. C.**—A new species of Pleocoma. [55] 9: 183-184.(*). **Wallis, J. B.**—Some new Dytiscidae. [4] 65: 268-278.(*).

HYMENOPTERA.—Bromley, S. W.—The sting of a tarantula wasp. [19] 28: 192. **Cockerell, T. D. A.**—New or little-known western bees. [55] 9: 153-159.(*). **Cockerell, T. D. A.**—A fossil sawfly from the Miocene shales near Creede. Colorado. [19] 28: 186-187, ill.(*). **Cole, A. C.**—Descriptions of two new ants of the genus Pheidole

(Formicidae). [7] 26: 616-618.(*). **Gahan, A. B.**—The serphoid and chalcidoid parasites of the Hessian fly. U. S. Dept. Agric.] Misc. Pub. 174: 148pp., ill.(*). **Handlirsch, A.**—Hymenoptera in Kukenthal's u. Krumbach's. Handbuch der Zoolog. IV, 2: 893-1036, ill. **McKenzie, H. L.**—Note on the tarantula hawk wasps. [55] 9: 159. **Mitchell, T. B.**—A revision of the genus Megachile in the Nearctic region. Part I. Classification and descriptions of new species (Megachilidae). [1] 59: 295-361, ill.

Ward's Entomological Bulletin is publishing a series dealing with the fundamentals of entomology under the title "Insect Studies." It is written by Dr. Alexander B. Klots, head of the entomological department of Ward's Natural Science Establishment in Rochester, N. Y. The introduction in volume two, number 2, of this bulletin states the purpose of this series and the "Why" of the study of insects. The next installment will begin to answer the innumerable "Hows?" Both professional and amateur entomologists will, no doubt, find this series interesting reading and glean some worthwhile information. The same number contains some remarks on mimicry with illustrations of several examples: a note on the Colorado potato-beetle in England; notices of prices and lists of collections of ants and other insects; and recommending carbon tetrachloride as an insecticide and fumigant [this liquid is used at the Academy of Natural Sciences of Philadelphia, as a degreasing agent]. The unit tray system for collections is also discussed.

OBITUARY

To our great regret we have learned of the death of Professor HENRY FREDERICK WICKHAM, at Iowa City, Iowa, on November 17, 1933. According to *American Men of Science,* he was born at Shrewton, England, October 26, 1866, studied at the University of Iowa 1887-91, received its Master of Science in 1894 and became successively assistant curator of the Zoological museum 1891-1927, instructor and assistant professor of zoology 1894-1903, professor of entomology 1903, and professor of applied zoology 1919. At times he was also connected with the Bureaus of Entomology (1914-16) and of Biological Survey (1917-20) of the Federal Department of Agriculture.

His entomological work was mainly with the Coleoptera. The bibliography attached to Leng's *Catalogue of the Coleoptera of America North of Mexico* (1920) lists 147 papers by Wickham (pp. 441-443), chiefly but not exclusively on Coleoptera, which appeared in our various entomological journals from 1888 to 1918. To that *Catalogue* he contributed the list of Fossil North American Coleoptera, pp. 347-365, including references to 16 additional papers by himself. The *First Supplement* (1927), by Leng and Mutchler, to the Catalogue gives (p. 69) an additional list of 9 papers on recent and fossil Coleoptera by Wickham (1919-1923) and the latter contributed to it a supplemental list of fossil species (pp. 53-56). Finally the recent *Third Supplement* (1933) has a *Second Supplement to the Catalogue of North American Coleoptera described as Fossils* by Wickham (pp. 103-105) with references to two later papers by him in this field (p. 105).

Two of his papers came out in Volume I of ENTOMOLOGICAL NEWS: Notes from the North West (pp. 33-36), based on his collecting trip of the summer of 1889, and on the habits of some Meloini (pp. 89-90), chiefly of New Mexico. Many of his papers dealt with the Coleoptera of Canada in *The Canadian Entomologist* (1894-1899). Another series gave his Recollections of Old Collecting Grounds (ENT. NEWS, 1897-1899). Among his more extensive works was a Catalogue of the Coleoptera of Colorado, which appeared in the Bulletin of the Iowa Laboratory of Natural History for 1902. He was an honorary member of the Entomological Society of Ontario.

PHILIP P. CALVERT.

Prof. WILLIAM MORRIS DAVIS, distinguished member of the geological faculties of Harvard and the California Institute of Technology, died at Pasadena, California, February 5, 1934. He was born in Philadelphia, Pennsylvania, February 12, 1850, and was elected a resident member of the American Entomological Society June 8, 1874. We shall be glad to learn of any entomological publications by him.—EDITOR.

ERRATA: The *even*-numbered pages of the NEWS for January, 1934, are marked "Jan., '33," but should be "Jan., '34."

EXCHANGES

This column is intended only for wants and exchanges, not for advertisements of goods for sale or services rendered. Notices not exceeding three lines free to subscribers.

These notices are continued as long as our limited space will allow; the new ones are added at the end of the column, and, only when necessary those at the top (being longest in) are discontinued.

Wanted—Names and addresses of those desiring insects from Wisconsin. Will collect in all orders from May to October. Correspondence invited. George Kettler, Platteville, Wis.

Wanted—Names and addresses of those desiring Coleoptera, Lepidoptera and Hymenoptera of Pennsylvania and New Jersey. R. C. Casselberry, 71 E. Price Ave., Lansdowne, Pa.

Exchange—Texas Orthoptera. F. B. Isely, Trinity University, Waxahachie, Texas.

Wanted—Names and addresses of those desiring insects from Colorado. Charles H. Hicks, P. O. Box 262, Boulder, Colorado.

Desire to Exchange—Lepidoptera—pupae—ova. Cocoons, chrysalids especially wanted. Correspondence desired from all parts U. S., Canada, Mexico, Central, South America. Arthur Smith, Los Banos, California.

Geometers Wanted for cash, or in exchange for West Coast Butterflies, Noctuids or other Geometers. Edward Guedet, P. O. Box 305, Napa, Calif.

Wanted—Papilios, Ornithoptera, Uranias, Morphos, Theclas, uniques, and many other attractive butterflies. Also living cocoons and pupae. A. Glanz, 740 New Lots Ave., Brooklyn, N. Y.

FINE INDIAN BUTTERFLIES,

named in papers, 100, about 50 species, $6.00. 200 ditto, about 100 species, $12.00. About 200 species of named Indian Lycaenidae at cheap rates. Thousands of Morphos from French Guiana, etc., at cheap rates per dozen or 100.

British Lepidoptera and Coleoptera, named. Many important works on European Lepidoptera, etc. Particulars from

A. FORD, CZ., ENTOMOLOGIST
42, IRVING ROAD, BOURNEMOUTH, ENGLAND

For Sale Butterflies and Moths native to southern tip of Florida. Special: bred specimens of Citheronia sepulchralis at $5.00; Automeris lilith at 50 cents.

MRS. LESLEY E. FORSYTH,
Florida City, Florida.

WILL COLLECT for cash ALL ORDERS OF INSECTS, providing I receive sufficient orders prior to collecting to justify my proceeding. Have many specimens in stock at all times for sale.

Louise Knobel, Hope, Arkansas

RECENT LITERATURE

FOR SALE BY

THE AMERICAN ENTOMOLOGICAL SOCIETY

1900 RACE STREET, PHILADELPHIA, PA.

These prices to DOMESTIC PURCHASERS only.

Quotations to foreign purchasers will be given on application and are Subject to differences in Foreign Exchange rates.

HEMIPTERA

982.—**Blatchley** (W. S.).—Notes on a collection of Heteroptera taken in winter in the vicinity of Los Angeles, California. (Trans., **60**, 1-16, 1934) ..... .30

HYMENOPTERA

979.—**Mitchell** (T. B.).—A revision of the genus Megachile in the Nearctic Region. Part I. (Trans., **59**, 295-361, 2 pls., 1934) 1.30

LEPIDOPTERA

969.—**Williams** (R. C., Jr.).—A new Hesperid from Mexico. (Trans., **59**, 11-12, 1 pl., 1933) ..... .20

983.—**Williams & Bell.**—Studies in the American Hesperioidea. Part II. (Trans., **60**, 17-30, ill., 1934) ..... .30

ODONATA

981.—**Calvert** (P. P.).—Two Mexican species of Palaemnema. (Trans., **59**, 377-381, 1934) ..... .20

ORTHOPTERA

968.—**Rehn** (J. A. G.).—Some Dermaptera from Angola, Northern Rhodesia and Belgian Congo, with the description of a new species of Karschiella. (Trans., **59**, 1-10, ill., 1933) ..... .20

980.—**Hebard** (M.).—Studies in Orthoptera which occur in North America, north of the Mexican boundary. Parts 1 & 2. (Trans., **59**, 363-375, 1 pl., 1934) ..... .30

Herewith find remittance for $....., for which please send me the items checked above.

Write your name and address in the space below.

FOR SALE

A very fine collection of books and papers, mostly bound, relating to the

BUPRESTIDAE OF THE WORLD

Included are the works of Gory and Laporte, Chevrolat, Kerremans, Lacordaire ("Genera," Vol. 4), Mannerheim, Olivier, (Genre Bupreste), Obenberger, Saunders, Thery, Thomson, Waterhouse, the "Biologia" (portion on Buprestidae), and practically all of the literature on the species of North America. Further details will be furnished upon application.

CATALOGUE OF COLEOPTERA OF AMERICA NORTH OF MEXICO

With supplements 1 to 3 by LENG AND MUTCHLER
Containing entries to end of 1932

Price, Postpaid, $15.00

Catalogue 36, Beetles, 48 pages Catalogue 37, Scientific Serials, 16 pages
Catalogue 38, Bound Books, (In Preparation)
The above Catalogues will be sent to those interested

Many worth while collections of papers on various other entomological subjects are on hand, ALL ATTRACTIVELY PRICED, and others can readily be assembled without delay.

LARGEST STOCK OF ENTOMOLOGICAL BOOKS IN THE WORLD

JOHN D. SHERMAN, JR.
132 Primrose Avenue
MOUNT VERNON, NEW YORK.

Ward's Entomological Services

Entomological Supplies and Equipment

Carefully designed by professional entomologists. Material of high quality at low prices. *Send for Catalogue No. 348.*

Insect Preparations

Life Histories, Type Collections, Collections of Economic Insects and Biological Insect Collections. All specimens are accurately determined. *Send for Catalogue No. 360.*

Insects for the Pest Collection

We have in stock over three hundred species of North American Insect Pests. *Send for Price List No. 349.*

Ward's Entomological Bulletin

A monthly publication sent free to all entomologists requesting it.

Information for the Beginner

Send for "*Directions for Collecting and Preserving Insects*" by Dr. A. B. Klots. A mine of useful information. Price 15 cents.

Ward's Natural Science Establishment, Inc.

P. O. Box 24, Beechwood Station

ROCHESTER, N. Y., U. S. A.

The Frank A. Ward Foundation
of Natural Science of the
University of Rochester